REMARKS

Further to the Office Action mailed April 28, 2009, Applicant respectfully requests reconsideration.

Claims 1-15 have been examined. By this amendment, Applicant has amended claims 1, 2, 4, 5, 7-9 and 12-15 and added new claims 16-20. Applicant respectfully submits that no new matter has been added

In the Claims

Applicant has amended claims herein solely to expedite prosecution of this application. In doing so, Applicant does not dedicate the subject matter of the amended claims, as originally filed, to the public, and does not acquiesce to the Examiner's reason(s) offered in support of any rejections of the amended claims, or any claim(s) that depend therefrom. Applicant also reserves the right to seek patent protection for claims similar or identical to the amended claims, as originally filed, in one or more subsequently filed, related applications.

Rejections under 35 USC § 103

Claims 1-6 and 10 -12 stand rejected under 35 USC § 103 as being unpatentable over U.S. Patent 5,844,339 to Schroeder in view of U.S. publication 20040021381 to Garvey. Applicant respectfully traverses as set forth below.

Independent claim 1, as amended, is directed to an active magnetic bearing that comprises first and second opposing electromagnets. Each of the first and second electromagnets comprises a magnetic circuit essentially constituted by an excitation coil and a "first portion comprising a first ferromagnetic material." Further, each electromagnet includes a second portion "comprising a second ferromagnetic material having magnetic permeability that is lower than that of the first ferromagnetic material and electrical resistivity that is higher than that of the first ferromagnetic material." In each of the first and second electromagnets, the "second portion is located between the first portion and the excitation coil."

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In general, the two portions "channel" the high frequency magnetic field lines for auto-detection of the positioning of the bearing. The first portion passes the low-frequency magnetic fields generally used to control position while the second portion passes the higher frequency used to detect position.

The Examiner asserts that Schroeder teaches all of the limitations of claim 1 except for the different magnetic permeabilities and electrical resistivities of the first and second ferromagnetic materials. The Examiner, however, cites Garvey as disclosing materials of different magnetic permeabilities and resistivities to guide magnetic flux pattern in the bearing unit.

According to the Examiner, Office Action mailed April 28, 2009, at page 3:

> it would have been obvious....to modify the bearing of Schroeder et al. with sections of differing magnetic permeabilities and resistivities around the excitation coil, as taught by Garvey, so as to guide the magnetic frequencies in the desired pattern.

Garvey is directed to a magnetic bearing in which bearing forces can be developed as a result of magnetic sheer stresses acting across three or more substantial interleaf gaps. (Paragraph 34). Further, in some preferred embodiments of the Garvey invention, electrically conductive material is arranged to allow the flow of electric currents in order to influence the path of magnetic flux across at least one interleaf gap. (Paragraph 42). Further, permanent magnet material may be distributed within the interleaved bearing elements in order to influence the path of magnetic flux across at least one interleaved gap. (Paragraph 42). Referring to an active radial-magnetic bearing, Garvey teaches that a set of alternating regions 37 of low relative permeability and regions 38 of high relatively permeability are provided. (Paragraph 141; Fig. 29). An internal MMF (magneto-motive force) source 36 and an external MMF source 35 produce a 2-pole MMF. (Paragraph 142). As shown in Garvey, Fig. 29, the paths 39 taken by magnetic flux through the bearing exhibit a zig-zag pattern and thus a "substantial air gap sheer-stress across each individual air gap acting [in the present instance] to pull the bearing rotor down and to pull

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the bearing statter up," is evident. (Paragraph 143, Fig. 29). According to Garvey, "the lines of magnetic flux effectively try to straighten out to minimize the reluctance of the magnetic path." (Paragraph 143). Garvey, however, is not directed to channeling magnetic fields of differing frequencies.

Applicant respectfully re-submits the argument that the Examiner has failed to establish a *prima facie* case of obviousness with respect to the combination of Schroeder and Garvey. As reiterated by the Supreme Court in KSR International Co. v. Teleflex Inc., 550 U.S. ___, 82 USPQ2d 1385 (2007), (KSR), the framework for the objective analysis for determining obviousness is stated in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966). Obviousness is a question of law based on these underlying factual inquiries: (A) determining the scope and content of the prior art; (B) ascertaining the differences between the claimed invention and the prior art; and (C) resolving the level of ordinary skill in the pertinent art. (See MPEP § 2141). Once the Graham factual inquiries are resolved, the obviousness analysis must be made.

"The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious." (See MPEP § 2141, citing KSR ("The Court quoting In re Kahn, citations omitted, that 'rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.' KSR, 550 U.S. at ___, 82 USPQ2d at 1396.")

Applicant respectfully submits that Schroeder teaches away from magnetic circuits with differing materials.

Specifically, at column 6, lines 54-58, Schroeder discloses that:

> the magnetic circuits 12 and 22 of the bearing are made of a material whose permeability varies little as a function of magnetic induction, in particular in the operating zone of the electromagnet, i.e., its saturation zone.

Thus, not only is Schroeder silent as to magnetic circuits with materials that have different magnetic permeabilities and electrical resistivities, but Schroeder also goes so far

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as to teach that the electrical circuits should be made of a material with permeability that varies only a little.

The Examiner has failed to provide an articulated explanation or reasoning as to why one of ordinary skill in the art would combine these references. Considering that Schroeder teaches away from a magnetic circuit comprising different materials, absent a reference to Applicant's own teaching, **and in conflict with Schroeder's explicit teaching**, one of ordinary skill in the art would have no reason to combine the teachings of Schroeder with those of Garvey.

Accordingly, Applicant respectfully submits that, for at least reason that the combination of Schroeder and Garvey is improper, claims 1-6 and 10-12 are patentable.

Assuming, without agreeing, that the combination of Schroeder and Garvey is appropriate, Applicant respectfully submits that the combination does not render obvious that which is recited in Applicant's claims.

Applicant respectfully submits that independent claim 1, as amended, is patentable over the cited combination of Schroeder and Garvey for at least the reason that there is no teaching or suggestion that the second portion, i.e., the portion having the magnetic permeability that is lower than that of the first ferromagnetic material and electrical resistivity that is higher than that of the first ferromagnetic material, is located between the first portion and the excitation coil powered from a power amplifier whose input current is servo-controlled, all as recited in claim 1.

Applicant respectfully submits that a combination of Schroeder and Garvey results in, at most, bands of alternating ferromagnetic material but not as arranged as is recited in independent claim 1.

Accordingly, Applicant respectfully submits that independent claim 1, and dependent claims 2-6 and 10-12, for at least the reason that they depend either directly or indirectly from claim 1, are allowable over the cited combination of Schroeder in view of Garvey.

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Claim 7 stands rejected under § 103 as being unpatentable over Schroeder and Garvey as applied to claim 4 and further in view of Meeks.

Applicant respectfully submits that claim 7 is allowable for at least the reason that Meeks does not remedy the deficiencies of Schroeder and Garvey.

Claims 8 and 13 stand rejected under § 103 as being unpatentable over Schroeder and Garvey as applied to claims 1 and 4 and further in view of Clark.

Applicant respectfully submits that claims 8 and 13 are allowable for at least the same reasons as submitted above with regard to independent claim 1 as Clark does not remedy the deficiencies of Schroeder and Garvey.

Claim 9 stands rejected under § 103 as being unpatentable over Schroeder and Garvey as applied to claim 1 and further in view of SKF "Hybrid Bearings for Electrical Machinery."

Applicant respectfully submits that claim 9 is allowable for at least the same reasons as submitted above with regard to independent claim 1, as the SKF reference does not remedy the deficiencies of Schroeder and Garvey.

Claim 14 stands rejected under § 103 as being unpatentable over Schroeder, Garvey, and Meeks as applied to claim 7 and further in view of SKF and Clark.

For at least the same reasons as submitted above with regard to independent claim 1, Applicant respectfully submits that dependent claim 14 is allowable as SKF and Clark do not remedy the deficiencies of Schroeder, Garvey or Meeks.

New Claims

New claim 16 depends from independent claim 1 and recites that the first portion is configured with a U-shaped cross-section and the second portion is positioned within the U-shape of the first portion. Applicant respectfully submits that new claim 16 is allowable over the cited references, either individually or in any valid combination, for at least the reason that there is no teaching or suggestion of either a U-shaped component or of

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placing the second portion within the U-shape of the first portion. As taught in the present specification, the provisioning of the two portions, with the differing magnetic permeabilities and electrical resistivities, allows for the channeling of the high and low frequencies used to control the bearing.

For at least this reason, Applicant respectfully submits that new claim 16 is allowable over the references of record.

New independent claim 17 is directed to an active magnetic axial bearing having a rotor and first and second stators with first and second ferromagnetic materials having differing magnetic permeabilities and electrical resistivities similar to that as recited in independent claim 1. Further, "in each of the first and second stators, the second portion is located between the first portion and the excitation coil."

New claim 18 depends from new independent claim 17 and further recites that the rotor comprises first and second rotor portions each disposed substantially in register with a corresponding respective second portion of one of the first and second stators.

For at least the reasons submitted above with regard to independent claim 1, Applicant submits that new claims 17 and 18 are patentable over the references of record.

New independent claim 19 is directed to an active magnetic radial bearing comprising a stator and a rotor configured to rotate relative to the stator. The stator comprises an excitation coil, a first stator portion comprising first ferromagnetic material comprising a stack of ferromagnetic laminations arranged parallel to an axial length of the rotor and a second stator portion comprising a second ferromagnetic material with the excitation coil surrounding the first and second stator portions, the second stator portion being located between the first stator portion and the excitation coil. The second ferromagnetic material has a magnetic permeability that is lower than a magnetic permeability of the first stator portion and the second ferromagnetic material has an electrical resistivity that is higher than an electrical resistivity of the first stator portion. Further, the rotor comprises first and second rotor portions disposed over an axial length of the rotor and substantially in register with, respectively, the first and second stator portions. The second rotor portion has a magnetic permeability that is lower than a

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magnetic permeability of the first rotor portion and the second rotor portion has an electrical resistivity that is higher than the electrical resistivity of the first rotor portion.

New claim 20 depends from claim 19 and recites that the first rotor portion comprises a first stack of ferromagnetic laminations arranged parallel to the axial length of the rotor and each lamination in the first stack is of a first thickness. The second rotor portion comprises a second stack of ferromagnetic laminations arranged parallel to the axial length of the rotor where each of the laminations is of a second thickness and the second thickness is smaller than the first thickness.

Applicant respectfully submits that new claims 19 and 20 are patentable over the references of record, either individually or in any combination, for at least the reason that there is no teaching or suggestion of an active magnetic radial bearing having a stator having an arrangement of first and second ferromagnetic materials with respect to an excitation coil, as is recited in independent claim 19.

In view of the foregoing, Applicant believes the pending claims are in condition for allowance and a notice to this effect is earnestly solicited. The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite allowance of the present application. The Examiner is hereby authorized to charge any fees due to this submission under 37 C.F.R. §§ 1.16 and 1.17, or credit any balance, to Deposit Account No. 23-0804.

Respectfully submitted,

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